

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Thagard, et al.
App. No : 10/772,049
Filed : February 4, 2004
For : MODIFIED ASPHALTIC FOAM
MATERIALS
Examiner : Cooney, J.
Art Unit : 1711
Conf # : 3911

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APPELLANTS' REPLY BRIEF

Mail Stop Appeal Brief - Patents

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Dear Sir:

In response to the Examiner's Answer electronically delivered on November 13, 2007, Appellants respectfully submit this Reply Brief.

Status of the Claims begins on page 2 of this paper.

Grounds for Rejection to be Reviewed on Appeal begin on page 3 of this paper.

Appellants' Arguments begin on page 4 of this paper.

Appendix A begins on page 9 of this paper.

STATUS OF THE CLAIMS

Claims 1-30 are pending and stand rejected by the Examiner. Appellants appeal the rejection of Claims 1-30. A listing of the Claims is attached hereto as Appendix A.

GROUND FOR REJECTION TO BE REVIEWED ON APPEAL

The Examiner has maintained the rejection of Claims 1-30 under 35 U.S.C. §103(a) as allegedly being obvious over Roy, U.S. Pat. No. 4,225,678 ("Roy") alone or in view of Tzeng et al., U.S. Pat. No. 5,965,626 ("Tzeng").

APPELLANTS' ARGUMENTS

Appellants hereby incorporate the arguments made in Appellants' Brief mailed August 20, 2007. For the reasons set forth below, Appellant maintains that Claims 1-30 are not obvious under 35 U.S.C. § 103(a) over Roy alone or in view of Tzeng et al. as argued by the Examiner in the Office Actions mailed July 20, 2005, January 10, 2006, May 31, 2006, February 5, 2006, and the Examiner's Answer mailed November 13, 2007.

Roy Alone or in View of Tzeng Does Not Render Claims 1-30 Obvious

The Examiner has failed to establish that Claims 1-30 are *prima facie* obvious over the cited references. Specifically, the references do not teach or suggest each and every limitation of the claims, and the skilled practitioner would not have a reasonable expectation of success given the teaching of cited art.

A. Modifying the process of Roy would not yield the intermediates defined by appellants' claims.

The Examiner argued that "it is within the purview of an ordinary practitioner having the teachings of Roy before them to add the asphalt component to any of the other ingredients prior to final work-up, including the isocyanate component." See Examiner's Answer, page 5, para. 2. However, a skilled practitioner modifying the process within the teachings of Roy would not arrive at the intermediates defined in appellant's claim.

Roy teaches first making an intermediate product consisting of a bitumen (e.g., asphalt) and a hydroxyl fatty oil (e.g., castor oil). See The '678 Patent, col. 4, ll. 24-41. Then the intermediate product is combined with other ingredients, including a polyhydroxy compound (e.g., polyols), a polyisocyanate and a gas-generating agent (e.g., blowing agent), to produce the desired foam product. Although an ordinary practitioner might very well change the order of adding ingredients, a fair reading of Roy would not lead the skilled practitioner to conclude that a segregated mixture of asphalt and isocyanate would lead to less violent foaming reaction or more homogenous reactant. Rather, Roy teaches that the essence of Roy's invention in the '678 Patent is the preparation of an intermediate product by reaction between bitumen and hydroxyl fatty oil. See *id.* at col. 1, ll. 12-17 and col. 2, ll. 48-68. In view of these teachings of Roy, an ordinary practitioner would produce an intermediate comprising these two ingredients prior to switching around the order of adding other ingredients.

For example, Claim 1 in the '678 Patent describes a process for manufacturing a polymeric foam comprising the step of combining four ingredients (a), (b), (c) and (d). It may be within the purview of an ordinary practitioner to switch the order of combining (a), (b), (c) and (d), but one of the ingredients (a) is the intermediate reactant of Roy that cannot be treated as simply individual ingredients used to make the intermediate product. The intermediate product is prepared by heating a mixture of a bitumen and a hydroxyl fatty oil to induce thermal reaction between the two components, and it is important according to the teachings of the '678 patent to first form the intermediate product as taught by Roy. *See id.* at col. 4, ll. 24-41. As a result, an ordinary practitioner following the teachings of Roy would not treat the two compounds in the intermediate product as separate and mixable with other ingredients in any order.

By changing the order of mixing ingredients, one cannot arrive at Appellants' intermediate (mixture A) as claimed. The mixture A consists of asphalt and one or more isocyanates as defined in Claim 1 of the instant application. In order to arrive at mixture A, an ordinary practitioner must only mix asphalt and isocyanates, without any other ingredient. However, modifying the step of combination as taught by Roy would only result in a mixture of polyisocyanate (i.e., ingredient (c)) and the product of heating asphalt and hydroxyl fatty oil (i.e., ingredient (a)) at best. Such product contains hydroxyl fatty oil that is not present in Appellants' intermediate mixture A. Accordingly, modifying the process of Roy, even in view of Tzeng, would not have arrived at the intermediates as defined by Appellants' claims.

B. Modifying in the manner of combining and mixing the materials for reaction and work-up of Roy does not arrive at the mixing arrangement of Appellants' claims.

The Examiner stated that Roy's employment of pre-mixing and mixing heads are for purposes of providing adequate reaction of its materials, work-up and inclusion and entrainment of additives. *See Examiner's Answer*, page 5, para. 3. The Examiner further stated that "[t]he employment and modification of the mixing means provided for by Roy for the purpose of providing expedient mixing is held and maintained to be an operation well within the skill of the ordinary practitioners in the art...." *Id.* However, the mixing arrangements defined in the claims produce a significantly different result than the arrangement described by the '678 patent. Indeed, Appellants' claimed arrangement of mixing heads further emphasizes the segregated nature of two intermediate mixtures, mixture A and mixture B.

The use of impingement dispensing heads in the instant claims is not mere duplication of Roy's mixing heads. The claims themselves make clear that the impingement dispensing heads are only used to mix and dispense each intermediate mixture separately. On the other hand, the conventional mixing head in Roy is used to combine and mix all ingredients prior to dispensing. See The '678 Patent, col. 7, ll. 60-69. As described in greater detail below, Appellants discovered that using the arrangement of the '678 patent produced a violent reaction that resulted in an unusable product. In contrast, by separating the intermediate mixtures and dispensing them through separate dispensing heads, a controlled reaction could be produced that resulted in a far superior product. Therefore, the claimed step of mixing the intermediate mixtures only after they have been dispensed from the impingement dispensing heads further distinguishes the claims from the mere mixture of all the ingredients at once and dispensing them through a conventional dispensing head, as disclosed by the '678 patent.

The Tzeng reference discloses nothing to suggest that dispensing separate intermediate mixtures through separate dispensing heads would be desirable for any purpose. Accordingly, the combination of the '678 patent with the Tzeng reference would not lead to the presently claimed invention. Accordingly, the rejections of the claims, based on either the '678 patent alone or in combination with the Tzeng reference, should be withdrawn.

C. Clear and Convincing Evidence Shower Unexpected Results Commensurate in Scope with the Pending Claims Has Been Established

The Examiner argued that Appellants' showings, including the affidavit evidence, are not commensurate in scope with the scope of the claims. See Examiner's Answers, 7. However, Appellants' showings are clearly sufficient to demonstrate that the new and unexpected results are attributable to the formation of segregated mixture of asphalt and isocyanates, and the showings clearly represent the materials encompassed by the claims.

To demonstrate that the new and unexpected results are due to the formation of a mixture consisting of asphalt and isocyanates, Appellants submitted comparative experimental results in the Declaration of Casey Tzeng with the Response to Office Action mailed on November 27, 2006. In this affidavit, the same ingredients were used for all experiments in order to fairly compare the results side by side. See Declaration of Casey Tzeng, tables 1-2. Two types of asphaltic foams were made by a process that does not require forming a mixture of asphalt and isocyanate, while another asphalt foam was made by the claimed process. See *id.* at para. 4-5.

When the process combining the complete mixture of asphalt and isocyanate was used to make a foam at 200 °F, the reaction was uncontrolled and violent and the foam expanded beyond the mold or became partially cured before filling the mold. *See id.* at para. 4. When the same process was carried out at a lower temperature (less than 200 °F), although the reaction was more controllable, but it resulted in the separation of the asphalt that led to partial curing and stringy asphalt. *See id.* at para. 5. Thus, the Declaration showed that poor results were achieved by the prior art process of the '678 patent across the entire range of temperatures tested.

In contrast to the results achieved using the prior art process, when the claimed process was used to make the foam at 125 °F, in contrary to what a skilled practitioner would expect, no separation of the asphalt was observed while the reaction was controllable. *See id.* at para. 6. The only difference between the experiments performed at a lower temperature (less than 200 °F) is that Appellants' process requires a mixture of asphalt and isocyanate to be made and kept separated from the rest of ingredients prior to the foaming reaction. Everything else being the same, it is clear that the only difference, forming a mixture of asphalt and isocyanate, surprisingly led to an asphalt foam that can be made at a lower temperature under a controlled foaming reaction and without separation of asphalt from isocyanate. Thus, the showings in the affidavit and prior arguments have provided the evidence needed for showing new and unexpected results due to the formation of a mixture consisting of asphalt and isocyanate.

In addition, Appellants' showings fully represent the materials encompassed by the scope of the claims. The materials encompassed by the broadest claim, Claim 1, include a mixture consisting of an asphalt and one or more isocyanates and a second mixture comprising one or more polyols, a blowing agent, and a surfactant. The results achieved were based on the use of Appellants' claimed invention involving separating the intermediate mixtures as recited in the claims and mixing them after dispensing through separate dispensing heads. These experiments were conducted using all the materials in Claim 1. No additional information would be needed for one having ordinary skill in the art to conclude that the invention as claimed could achieve the unexpected results described. Accordingly, Appellants have presented sufficient evidence to establish new and unexpected result commensurate in scope with the claims.

Conclusion

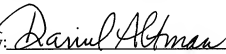
For the above reasons, Appellants submit that the Examiner has failed to show that the cited references teach or suggest each and every claim limitation of Claims 1-30, and a prima facie case of obviousness has not been established for any of the pending claims. Moreover, the significant unexpected results obtained using Appellants' invention further evidences the nonobviousness of the presently pending claims. Accordingly, Appellants respectfully request that the rejection of Claims 1-30 under 35 U.S.C. § 103(a) be withdrawn, and that those claims be allowed.

No fees are believed due in connection with the submission of this brief. However, should any fees be required, please charge them to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 14 Jan. 2008

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APPENDIX A – LISTING OF CLAIMS

1. (Previously presented) A method for producing asphaltic foam comprising the steps of:

providing an asphalt;

liquefying said asphalt;

adding to said asphalt one or more isocyanates, thereby forming a first intermediate mixture;

bringing the temperature of said first intermediate mixture to between about 120°F and 170°F;

forming a second intermediate mixture comprising one or more polyols, a blowing agent, and a surfactant, wherein the second intermediate mixture is segregated from the first intermediate mixture;

forcing said first intermediate mixture through a first impingement dispensing head;

forcing said second intermediate mixture through a second impingement dispensing head; and

mixing said first intermediate mixture forced through said first impingement dispensing head with said second intermediate mixture forced through said second impingement dispensing head, thereby forming a final reaction mixture, wherein said first intermediate mixture and said second intermediate mixture react and expand in a controllable manner such that the final reaction mixture does not expand beyond a form desired in a final molded asphaltic foam or cure before taking on said form to produce said asphaltic foam.

2. (Original) The method of Claim 1, wherein the asphalt comprises the following components:

about 12-13% by weight asphaltene;

about 9-12% by weight saturated hydrocarbons;

about 38-44% by weight polar components; and

about 35-38% by weight naphthalene aromatic constituents.

3. (Original) The method of Claim 1, wherein the second intermediate mixture comprises at least one additional ingredient selected from the group consisting of catalyst and fire retardant.

4. (Original) The method of Claim 1, wherein the surfactant is a silicone surfactant.

5. (Original) The method of Claim 3, wherein the catalyst is a curing catalyst.

6. (Original) The method of Claim 3, wherein the fire retardant is TCPP.

7. (Original) The method of Claim 1, wherein the isocyanate is polymeric methylene diphenyl diisocyanate (MDI).

8. (Original) The method of Claim 1, wherein the first intermediate mixture comprises about 1:1 to about 1.5:1 polyisocyanate:asphalt.

9. (Original) The method of Claim 1, wherein the polyol is an amino-based polyol.

10. (Original) The method of Claim 1, wherein the blowing agent is selected from the group consisting of water, halocarbons, and mixture of ethanol and dibutylphthalate.

11. (Original) A method of forming a ridge cap or roofing tile comprising the steps of:

providing a conveyor belt;

applying a granule layer to said conveyor belt;

providing a mold with a top side open;

filling the mold with a reaction mixture produced by a method of Claim 1;

applying the mold with the open side down on said granule layer; and

curing the asphaltic foam; thereby forming the ridge cap or roofing tile.

12. (Original) The method of Claim 11, additionally comprising the step of forming an indentation on said granule layer after applying the granule layer on said conveyor belt.

13. (Original) The method of Claim 11, additionally comprising the step of applying a second granule layer having a contrasting color compared to the color of said first granule layer.

14. (Original) The method of Claim 11, wherein said mold comprises an indentation.

15. (Original) The method of Claim 11, further comprising applying a strip of modified asphalt onto the granule layer before applying the asphaltic foam.

16. (Original) The method of Claim 15, further comprising applying a fire resistant roofing underlayment onto the strip of modified asphalt.

17. (Original) The method of Claim 16, wherein the fire resistant roofing underlayment is a coated substrate product with fire-resistant qualities.

18. (Original) The method of Claim 11, wherein the second intermediate mixture comprises at least one additional ingredient selected from the group consisting of catalyst and fire retardant.

19. (Original) The method of Claim 18, wherein the catalyst is a curing catalyst.

20. (Original) The method of Claim 11, wherein the surfactant is a silicone surfactant.

21. (Original) The method of Claim 11, wherein the isocyanate is polymeric methylene diphenyl diisocyanate (MDI).

22. (Original) The method of Claim 11, wherein the first intermediate mixture comprises about 1:1 to about 1.5:1 polyisocyanate:asphalt.

23. (Original) The method of Claim 11, wherein the polyol is an amino-based polyol.

24. (Original) The method of Claim 11, wherein the blowing agent is selected from the group consisting of water, halocarbons, and mixture of ethanol and dibutylphthalate.

25. (Previously presented) The method of Claim 1, wherein the mixing step produces an initial cream time in which the final reaction mixture thickens.

26. (Previously presented) The method of Claim 1, wherein the initial cream time lasts for about 15 to 20 seconds.

27. (Previously presented) The method of Claim 1, wherein the mixing step lasts about 2 to 6 seconds.

28. (Previously presented) The method of Claim 25, wherein the initial cream time is followed by an expansion stage in which production of CO₂ causes expansion of the final reaction mixture.

29. (Previously presented) The method of Claim 1, wherein the blowing agent volatilizes during the expansion stage.

30. (Previously presented) The method of Claim 1, further comprising
placing said final reaction mixture in a mold or placing a mold around the final
reaction mixture;
expanding the final reaction mixture in the mold; and
curing the expanded final reaction mixture.

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